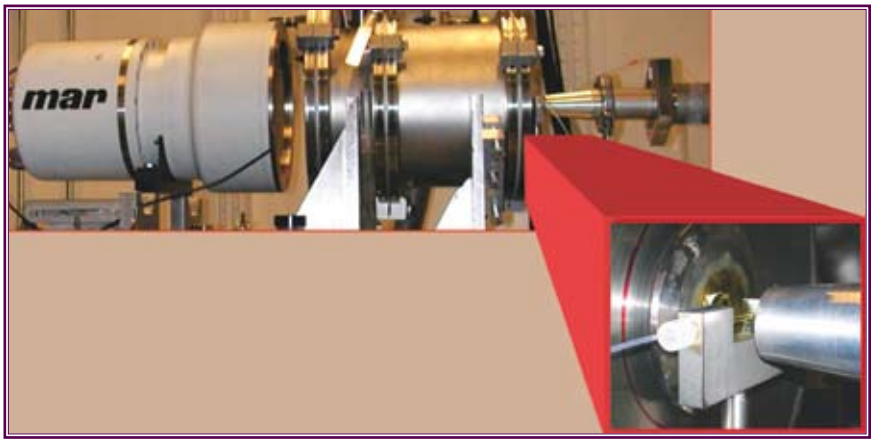
A New PUP for CCR

Determining the proteins, nucleic acids, and the complexes they form in the cell is a daunting task recently made easier for CCR scientists. A new Partnership User Program (PUP) with the Advanced Photon Source of the Argonne National Laboratory gives CCR researchers access to a high-flux, brilliant X-ray beamline used to perform small- and wide-angle X-ray scattering (called SAXS and WAXS, respectively). The data they generate with SAXS/WAXS gives scientists an unprecedented view of complex biological macromolecules in solution.

SAXS complements X-ray crystallography and solution nuclear magnetic resonance (NMR) spectroscopy by providing the full outline of a molecule in solution. It also is used to discover the molecular weight of large proteins in solution, aggregation states of proteins and RNAs, molecular interactions, and protein and RNA folding and unfolding.

Since PUP began, many CCR and extramural laboratories have put the beamline to work using SAXS to:

- Determine protein-protein complexes that play roles in cell migration/adhesion processes, in Jak-Stat signaling, and in the ubiquitination pathway. (Yun-Xing Wang, Ph.D., Head of the Protein-Nucleic Acid Interactions Section of the Structural Biophysics Lab [SBL] at CCR, and R. Andrew Byrd, Ph.D., Chief of the SBL)
- Combine SAXS with NMR to discover the global structures of large RNA molecules in solution. (Yun-Xing Wang, Ph.D.)
- Provide important information on the size and shape of the structural proteins of HIV and other retroviruses. (Alan Rein, Ph.D., Head of NCI's HIV Drug Resistance Program)



(Photo: Argonne National Laboratory)

Advanced Photon Source at the Argonne National Laboratory

- Study the structural biology of the Rev Response Element, a region in the HIV virus that signals for viral RNA to exit the host cell's nucleus. (Stuart Le Grice, Ph.D., Head of the Center of Excellence in HIV/AIDS & Cancer Virology at CCR)
- Characterize the dimerization state of α-lactalbumin and its mutants in different conditions. (Pradman Qasba, Ph.D., of CCR's Nanobiology Program)

Beyond CCR, scientists from the National Institute of Diabetes and Digestive and Kidney Diseases and academe—the University of Wisconsin, the University of California at Los Angeles, Johns Hopkins University, the University of Toronto School of Medicine, the Lerner Institute of the Cleveland Clinic, the University of Pittsburgh School of Medicine, and the University of Arizona Pharmacy and Medical School—use the beamline for their research with help from SBL scientists Xiaobing Zuo, Ph.D., and Jinbu Wang, Ph.D.

Young Talent in the Pipeline

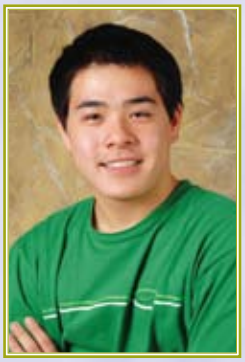
Liv Johannsen
CCR intern in the Cancer and Inflammation Program
Mentor: Nadya Tarasova, Ph.D.

- Grand Prize winner at the Frederick County Science and Engineering Fair
- Cash award at the Intel International Science and Engineering Fair
- Full scholarship from the University of Maryland College Park

(Photo: SAIC-Frederick Photography)

Marvin Gee
CCR intern in the Laboratory of Comparative Carcinogenesis
Mentor: Yih-Horng Shiao, Ph.D.
Sponsor: Lucy Anderson, Ph.D.

- Semifinalist in the Intel Science Talent Search



(Photo: SAIC-Frederick Photography)